

CRL School 2023

Teaching Earthquakes in classroom using open data, case study: active fault bases.

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Definition

Open data is "digital data that is made available with the technical and legal characteristics necessary for it to be freely used, reused, and redistributed by anyone, anytime, anywhere" (*Open Data Charter 2015, para. 1*).

Pedagogical connections

- Rather than suggest that open data offers an entirely new pedagogy, it is important to identify links with existing teaching and learning concepts to guide research and practice.
- Four such connections are:
- Inquiry-based learning,
- Open education,
- Personalisation,
- Authenticity.



Why open data in geosciences education?

- Butcher (2015) summarizes three transformative benefits of OER, which could be applicable to open data:
- Increased range and reduced cost of resources.



- Support for adaptation of materials, which allows educators and students to be active participants who learn by doing and creating.
- Building capacity by providing educators access to the means of production of the resources.

Why open data in geosciences education?

- The Mediterranean region is often affected by earthquakes, which cause adverse effects in the social and economic sector.
- The understanding of the risks associated to natural phenomena and the increased awareness and preparedness of citizens can effectively contribute to limiting their negative effects on society (Sendai Framework 2015-2030).
- Urbanization and population growth in areas prone to natural disasters intensify the resulting negative socio-economic impacts.
- Given that an increase in the occurrence of natural disasters is predicted in this area, it is imperative to prevent and manage-deal with the problem by developing and implementing appropriate actions. The development and implementation of appropriately designed educational activities contributes to this direction.



What is the framework that open data can be included in the Geosciences' education

State:

In order for an activity to be included in teaching, it must be supported by a specific pedagogical framework.

Teaching tool:

The active fault bases is a teaching tool and in particular, the "model" teaching tool.



The benefits for students

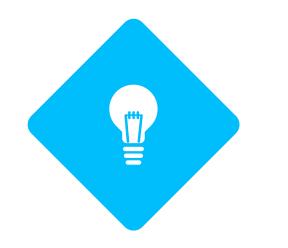
Provides the opportunity to students

- ✓ to observe
- \checkmark to describe
- to study the creation of naturals hazards

To develop

- ✓ emotional abilities
- ✓ psychomotor skills

within the field of learning of the geo-environment.



The benefits for students

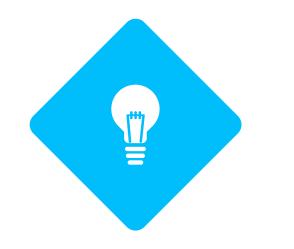
Introduces to students

the research and exploratory way of thinking

In order to be able to:

- ✓ understand
- \checkmark clarify
- ✓ correlate

the principles of natural sciences that they are taught at the curriculum concerning the phenomenon.



The benefits for Teachers

Allows teacher-student collaboration

Active fault bases can help teaching many subjects, such as:

✓ Geology
✓ Physics (Oscillations, Energy, Electricity)
✓ Robotics - STEM

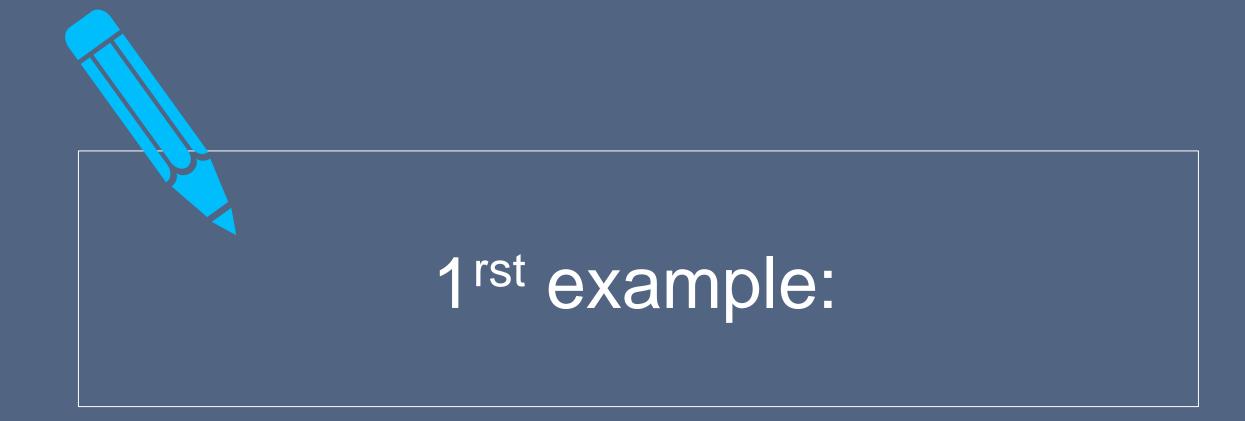
It can be a basis for expansion into other models, such as the phenomena of:

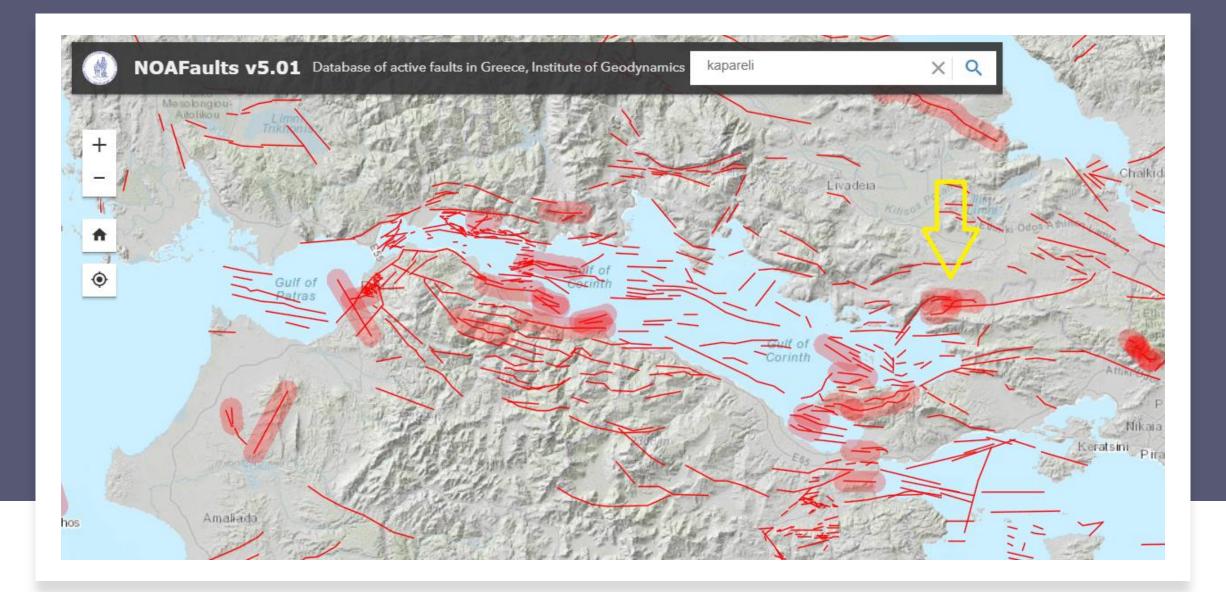
✓ Tsunamis

✓ Liquefaction

✓ All Naturals Hazards

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https://noa-beyondapps.maps.arcgis.com/

Student's sheets

Fault's data/Name	Egion	Erateini North	East Helike Fault	Kaparelli 3 fault
Geological Setting				
Seismic Event				
Historical Seismicity				
Maximum Magnitude				
Kinematics				
Risk Level				

Ask your students....

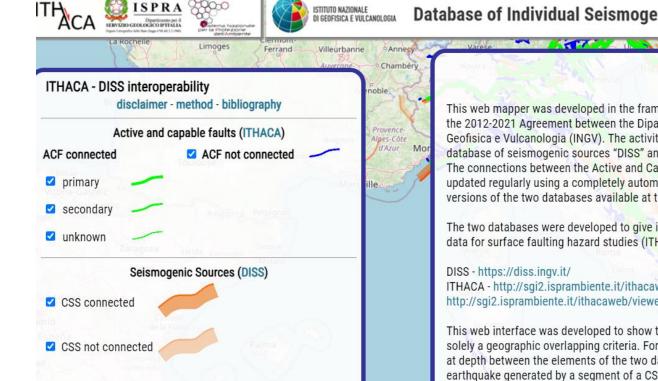
✓How do we recognize a fault in the field?

✓ rank the faults from oldest to newest....

✓ rank the faults from higher magnitude to smaller....

 find for a link (if it is possible..) between faults magnitude and geological Setting

Promote your students to be "researchers"....



Web mapper showing the geographic connections among the Active and Capable Faults of the ITHACA database and the Composite Seismogenic Sources of the DISS database, developed automatically using the interoperability between the two databases and the web services provided by them.

This web mapper was developed in the framework of the activity of the Task 3 of the Work Package 1 "Earthquake" of the 2012-2021 Agreement between the Dipartimento della Protezione Civile (DPC) and the Istituto Nazionale di Geofisica e Vulcanologia (INGV)

Database of Individual Seismogenic Sources

Disclaimer

Kecskemét

Szeged

© OpenStreetMap contributors.

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This web mapper was developed in the framework of the activity of the Task 3 of the Work Package 1 "Earthquake" of the 2012-2021 Agreement between the Dipartimento della Protezione Civile (DPC) and the Istituto Nazionale di Geofisica e Vulcanologia (INGV). The activities were aimed at developing the interoperability between the INGV database of seismogenic sources "DISS" and the ISPRA database of Active and Capable Faults "ITHACA". The connections between the Active and Capable Faults (ACF) and the Composite Seismogenic Sources (CSS) are updated regularly using a completely automatic procedure that exploits the web services and use the most updated versions of the two databases available at the moment.

The two databases were developed to give information about the potential sources of seismic shaking (DISS) and input data for surface faulting hazard studies (ITHACA) and are publicly available from the following links:

ITHACA - http://sgi2.isprambiente.it/ithacaweb/default.aspx#1; web viewer: http://sgi2.isprambiente.it/ithacaweb/viewer/.

This web interface was developed to show the potential connections existing between the ACF and CSS datasets using solely a geographic overlapping criteria. For this reason, there exist uncertainties about the real structural relationships at depth between the elements of the two datasets, so the connections established do not automatically imply that an earthquake generated by a segment of a CSS can certainly activate one of the surface active and capable faults connected.

Credits

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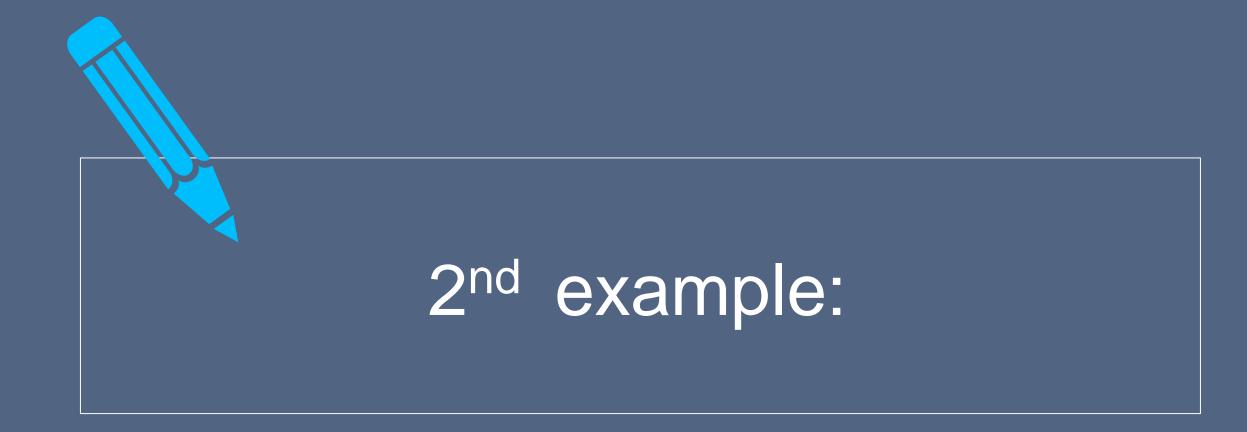
DISS Working Group (2021). Database of Individual Seismogenic Sources (DISS), Version 3.3.0: A compilation of potential sources for earthquakes larger than M 5.5 in Italy and surrounding areas. Istituto Nazionale di Geofisica e Vulcanologia (INGV). https://doi.org/10.13127/diss3.3.0

Gruppo di Lavoro ITHACA (2019). ITHACA (ITaly HAzards from CApable faults) - Catalogo delle faglie capaci in Italia. http://sqi2.isprambiente.it/ithacaweb/viewer/, Istituto Superiore per la Protezione e la Ricerca Ambientale.

Ain Beida While having benefited from the financial contribution of the Presidenza del Consiglio dei Ministri - Dipartimento della Protezione Civile for the development of this web interface, the Authors remain responsible for the contents, which

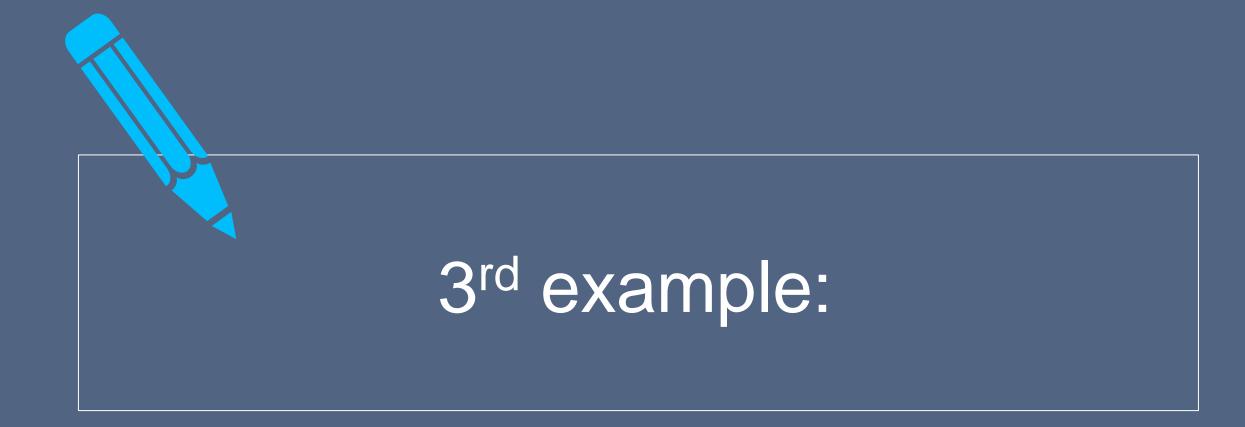
https://diss.ingv.it/ithdiss/

ITHACA Project



EarthViewer





Geology Unit: Plate Boundaries

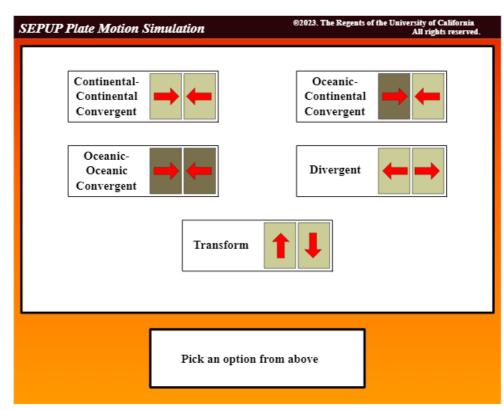
Plate Motion Simulation

Through this computer simulation, students investigate how Earth's surface changes over time due to geological processes caused by plate motion. Students analyze and interpret data from the simulation to identify the similarities and differences between the geological processes that happen at the three plate boundaries.

Resources

Student Book Pages 🗋 and Student Sheets 🗋

Simulation



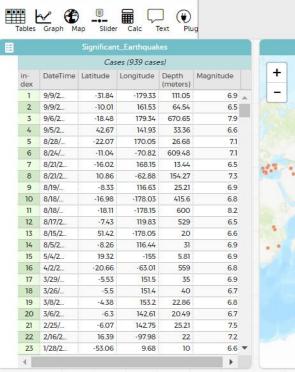
The Lawrence Hall of Science

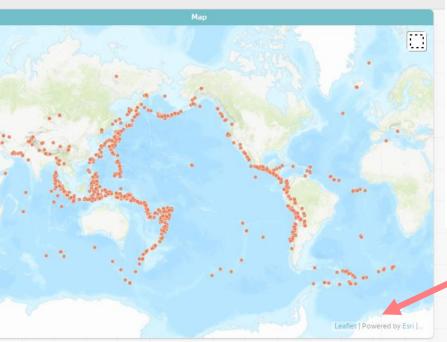
UNIVERSITY OF CALIFORNIA, BERKELEY



Earthquakes Volcanoes

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SEPUP Science Education for Public Understanding Program

// SIMULATION

Geology Unit: Mapping Locations of Earthquakes and Volcanoes

Mapping Locations of Earthquakes and Volcanoes Activity

Investigation - Mapping Location Data

In this activity, students use the science and engineering practice of analyzing and interpreting data as they map the locations of significant earthquakes and major volcanoes around the world. They look for patterns in the distribution of earthquakes and volcanoes as a first step in discovering that Earth's surface is broken into plates.

Resources

Student Book Pages 🔓 and Student Sheets 😭

Activity



Thank you for attention...

